U. S. Steel Corporation
Minnesota Ore Operations
P.O. Box 417
Mt. Iron, MN 55768

CERTIFIED MAIL 7009 0820 0001 3944 2388

December 30, 2015

Mr. John Thomas
Pollution Control Specialist Senior
Compliance and Enforcement Section, Industrial Division
Minnesota Pollution Control Agency (MPCA)
525 Lake Avenue South, Suite 400
Duluth, MN 55802

Re: Revised Groundwater Sulfate Reduction Plan (GWSRP) implementation update

Dear Mr. Thomas:

Pursuant to a February 25, 2014 approval letter of the revised GWSRP for the Minntac Tailings Basin, U. S. Steel is submitting this letter to the MPCA as the fourth required six month implementation update. As indicated in an April 25, 2014 letter to you regarding Selection of Alternatives for Further Investigation related to the GWSRP, U. S. Steel has chosen to evaluate implementation of a Permeable Reactive Barrier (PRB) that utilizes zero valent iron and/or addition of organic substrates, in combination with the existing seepage collection and return system, as a means to achieve compliance with groundwater standards at its property boundary near groundwater monitoring well 12 (MW12).

U. S. Steel has been working primarily with Ramboll-Environ, but also Northeast Technical Services and others, to investigate and evaluate PRB technology for use in this application. As discussed in the last six month update, field work was conducted in the vicinity of MW12 during the first half of 2015. The focus of the field work was in two main areas: 1) geophysical evaluations to determine the underlying bedrock topography and other subsurface characteristics of the site, and 2) installation of pumping wells and piezometers to assess the physical characteristics and hydrologic properties of the reworked glacial till/drift overlying the bedrock.

Laboratory work, in the form of microcosm studies, continued through the first half of 2015 and into the second half to quantify the interaction of various parameters (e.g., temperature, carbon substrates/additions, and reducing agents). Based on the results of the microcosm studies and the subsurface hydrologic evaluations discussed above, upflow column studies were designed and implemented at two separate laboratories to provide design information for an in-situ pilot study. The pilot study design was completed in early November and received capital funds authorization to proceed in mid December.

A conceptual pilot study design was outlined in a letter to MPCA on August 25, 2015. Since that submittal, the design of the pilot study changed due to new information, construction concerns and data from the ongoing column studies. The new design is a hybrid approach incorporating features of the three pilot-scale alternatives described in the August 25 update. The new hybrid approach is designed to mimic the features of a traditional PRB wall, but which extends through the entire soil column to bedrock. The initial design contained a traditional PRB wall that was limited to a total depth of only about 20 ft below ground surface due to construction and safety concerns.

The current design consists of three large diameter (5' – 7') borings, each backfilled with a zero valent iron (ZVI)/sand mixture, and arranged in a bowling pin configuration. Should there be an issue with completion of the large-diameter borings due to cobbles and/or boulders encountered at depth, an estimated total of nineteen 8-inch diameter borings will instead be completed and backfilled with the same ZVI/sand mix (see the attached figure). The addition of organic substrates into the subsurface downgradient of the PRB installation may or may not be required to promote the required sulfate reduction and will be determined by the performance of the pilot test. Please note that this current design plan is subject to change as field conditions require an adaptive design.

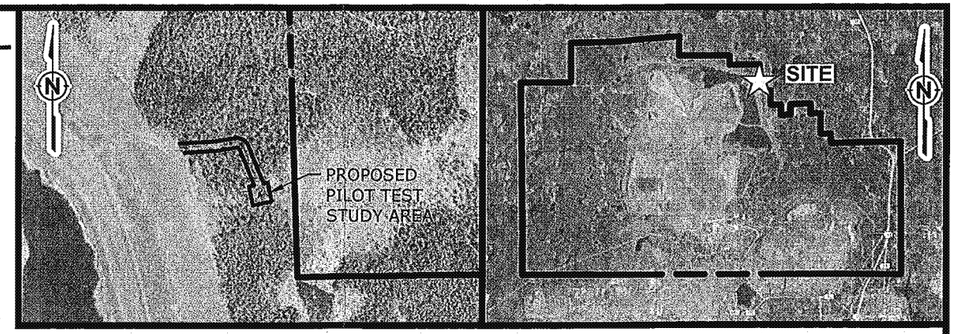
The pilot system construction is expected to start in the first quarter of 2016, pending a variance approval from the MN Department of Health and the issuance of any other required permits. Operation of the pilot study, including data gathering and system performance evaluation, is expected to continue for approximately two years after installation to allow for initial conditioning of the reactive material and subsequent operation/evaluation over one full non-frozen season.

If you have any questions or concerns regarding this matter, please contact me.

Sincerely,

Thomas A. Moe
Environmental Control Engineer
U. S. Steel Minntac
218-749-7485 – office
tmoe@uss.com – email

cc: Tishie Woodwell, U. S. Steel
Chrissy Bartovich, U. S. Steel
Eric Williams, U. S. Steel
Monica Gesk, U. S. Steel



KEY MAP
1" = 800'

VICINITY MAP
1" = 20,000'

PZ-PT-05S

PZ-PT-05D

PROPOSED
LARGE DIAMETER
CAISSON/SHAFT (3x)

PZ-PT-06D

PZ-PT-06I

20.0'

PZ-PT-06S

PROPOSED 2" PVC
MONITORING POINT

CONTINGENCY
SMALL DIAMETER
ZVI/SAND BORING
(19x) (8" BORING)

MW-PT-02

LEGEND

- APPROXIMATE US STEEL PROPERTY BOUNDARY
- 1465 - MAJOR CONTOUR (MnGeo)
- 1466 - MINOR CONTOUR (MnGeo)
- APPROXIMATE LIMITS OF PROPOSED PILOT STUDY WORK AREA
- EXISTING MONITORING WELL LOCATION
- PROPOSED MONITORING WELL TYPE A (4' TO 14' BGS)
- PROPOSED MONITORING WELL TYPE B (15' TO 25' BGS)
- PROPOSED MONITORING WELL TYPE C (26' TO 36' BGS)
- PROPOSED MONITORING WELL TYPE D (38' TO 48' BGS)

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SCALE IN FEET

PROPOSED PILOT STUDY AREA LAYOUT AND PERFORMANCE MONITORING PLAN

MINNTAC ORE FACILITY
UNITED STATES STEEL CORPORATION
MOUNTAIN IRON, MINNESOTA

RAMBOLL ENVIRON

DESIGN BY: RP/BR	DATE: 11/06/2015
DRAFTED BY: MSB	SCALE: AS SHOWN
APPROVED BY: NDS/WK	PROJECT: 0333435B

FIGURE
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